Engineering education world

Contributions are invited for this feature. News items on policies that concern the engineering education world, new courses and curricula either of a unique nature or of international interest, new innovative laboratories and concepts, funding news for engineering research projects involving international participation, special international continuing education courses and news, industry–university interaction, engineering faculty news, and developments in engineering education of international interest. Please send news items and conference information to the Editor-in-Chief. Public relations offices of universities and human resources divisions in industry are requested to contact the Editor with news items concerning engineering education and training.

United Kingdom

Peer reviews on the web?
An independent systems designer believes he has come up with a system of peer review, which could end claims of prejudice and secrecy in allocating research money. The idea from **Peter Jefferies**, who runs Jefferies Automotive Systems Ltd in Warwick, proposes to use the Internet to make the process as transparent as possible. Under his system, applicants would send in outline proposals of their research with suggested referees and an indication of the relevant field. This would be displayed on a web page, together with a list of the referees proposed. Those who had expressed an interest in knowing about proposals in that field would be given the page's web address. They and the applicant would be able to send in comments on the choice of referees and these would be added to the web page. The referees' comments would go on to the page, together with those from other interested parties. On the web page, the applicant would respond to all of the comments before a decision was made and added to the page, with reasons. If the outline were approved, the applicant would be invited to submit a full proposal, and more comments would be invited. Mr Jefferies said: 'This system is beyond reproach. Operated this way, it would overcome all of the questions raised about peer review.' **Richard Brook**, chairman of the Engineering and Physical Sciences Research Council, said Mr. Jefferies' scheme was an interesting one and he was always pleased to hear alternatives to the existing system. He was concerned, however, that it would not offer enough protection for academics worried about others gaining access to their original ideas. Mr. Brook also warned that once the system's novelty wore off, serious academics would not bother adding comments to the site and that the process could take too long.

Germany

German students like to study abroad
A survey by the DAAD, the German Academic Exchange Service, found that 13 000 Germans went abroad under the European Union's Erasmus and Socrates exchange programs in 1997–98—about one-sixth of all participants in the program. Britain was the most popular destination for the German students, attracting about a third of them. Business, foreign languages, and engineering were their most popular fields of study. Germany attracted fewer students from the other 14 European Union countries—a total of about 9700, creating an imbalance in the exchange system. It was behind two other countries in that category: Britain, which attracted 19 600 students from European Union countries, and France, with 14 086. Reasons for the imbalance can be seen in

the high popularity of English language, the individual contact and supervision, and the rigid German curricula.

Engineers in demand again but nowhere in sight
For years the number of new engineering students has been on the decline. Capacities at engineering schools are up to three times as high as new engineering students being recruited. In mechanical engineering the number of students has been halved since 1990. The reasons have been discussed before in these pages. First, the number of new students in German universities is moving in step with the demand of graduates for the profession. Therefore, an anticyclical demand/availability pattern is created. For almost ten years now, new graduates have had difficulties in procuring their first job offers. With a large number of engineers reaching retirement age there is a dearth in the supply of young graduates. A further factor is a prevalent opinion that young Germans are against new technologies. In particular, schools are currently notorious for generating an anti-technology mood. In addition, the current generation of school leavers comes from the low birthrate in the late nineteen-sixties. Attempts to remedy the situation are being made through increased offers of internships for schools by industry and by information and marketing campaigns by engineering schools.

France

The higher-education system is elitist, confused, and bureaucratic
In a new assessment of French higher education a government commission has called the system elitist, saying it does not respond to the needs of students. Higher education in France, says the commission's report, 'has, with time, become confused and bureaucratic'. France's two-tier system is unique in Europe. In addition to the universities, it includes several highly selective private and public schools of business, engineering, and management. Those institutions train the future elite for jobs in the private sector and the top levels of the civil service, where positions are reserved for the best graduates. The report urges an end to the monopoly that the institutions have on top jobs by allowing university graduates to compete openly for them. The commission, which was appointed by the Minister of Education, **Claude Allegre**, is an advisory panel, but if the government takes up that recommendation, it would mark a radical break with tradition. The government spends $6000 per year on a university student, but as much as $16 000 per student for those at the elite schools. The report proposes bringing the universities and the elite schools into closer contact, through the exchange of professors and facilities.

The report criticises the failure of the universities to prepare students for specific careers. It calls for a three-year undergraduate degree that would combine general courses with professional training. Students now get specialised training only after they have completed their three-year program. To make the universities more responsive to the public, the report says that business and community leaders should be able to vote for university presidents. Up to now, students and faculty members have held that responsibility. The National Syndicate of Higher Education Teachers, France's largest faculty union, has dug in its heels at that suggestion. 'A president must be representative of the university,' said **Claude Lecaille**, a spokesman for the union. 'Our autonomy is at stake.'

The report also proposes a system of external university evaluations, which would be linked to financial rewards and incentives. **Jacques Attali**, the commission's chairman, said French universities were too removed from the outside world. If they want their research to have more impact, he said, 'they must participate in the creation of new companies.' The report says universities should be allowed to invest in new companies and house them on their campuses. Mr. Attali acknowledged that revamping the system would take much time and money. But he warned that if no reform was undertaken, 'France will suffer irreversible decline. The French system like the German counterpart is struggling to compete in a world that increasingly eyes the British-American systems as the model, and which may be the most pragmatic for the future.'

USA

President of engineering university forced to resign
The president of Rensselaer Polytechnic Institute, **R. Byron Pipes**, resigned after the Faculty Senate issued a vote of no confidence in him. He was for five years head of Rensselaer. Mr. Pipes said in a statement 'I take full responsibility for my decisions as president. While I believed my actions were in the best interest of the institution, now is a time for the university to come together, and I believe that Rensselaer will best be able to do that under a new president.' The 21-member Faculty Senate, after issuing its no-confidence vote, had agreed to conduct a vote among the entire faculty, which became unnecessary due to the resignation. Discontent among faculty members had been brewing for some time about what they viewed as Mr. Pipes's authoritarian management style. The tension reached a peak when the dean of the School of Engineering stepped down and the president tried to fill the position without consulting with professors. 'The primary concern was the lack of faculty involvement in decisions,' said **Mr. Wallace**, an engineering professor. He said Mr. Pipes 'actually did a good job as

president' in creating distance-education programs and studio classrooms.

US academic salaries
Professors at both public and private four-year institutions earned average raises of 3.2 per cent this year, twice the rate of inflation. An annual survey of faculty salaries found that on average, faculty members at public colleges earned $53 296, while their counterparts at private institutions earned $51 448. In 1996–97, professors at public colleges earned raises of 6.14 per cent, on average, compared with those at private colleges, whose raises averaged 2.5 per cent. The rate of inflation then was 3.3 per cent. As in the past, engineering professors at public institutions earned more than their colleagues in other disciplines—an average of $67 918. Engineers were only in second place at private institutions, where they earned $71 011, on average. Professors in the health sciences and public health earned the top average salaries in private institutions in 1997–98. They earned average salaries of $75 611. Copies of the surveys are available from The College and University Personnel Association, 1233 20th Street, N.W., Suite 301, Washington 20036; (202) 429-0311, ext. 395.

All courses on the Web at UCLA
The University of California at Los Angeles is completing its first academic year in which every course in the main undergraduate college has a WorldWideWeb page. When the program was announced last year, some faculty members at UCLA embraced it as a novel way to insure that all disciplines would make use of new technology to improve undergraduate education. Others, however, viewed the program as an intrusion by the UCLA administration into how professors teach, and questioned whether any curricular innovation should be tried in all courses. UCLA officials deny that they required the creation of the pages, but many faculty members believe that they were not really given any choice in the matter. Even though the program has been running for a year, debate continues. Some professors say that the Web pages have significantly improved their courses and their interaction with students. Others say the changes have been minimal. The students, for their part, are split over the pages' value. Some question a special fee they are being charged for the pages—however useful and educational they are.

UCLAs unusual effort to build a Web page for every course in the main undergraduate college is called the 'Instructional Enhancement Initiative.' It is a plan with which the university's administrators hope to weave technology inextricably into university life. At most universities, only professors with an interest in technology take the time to build home pages for their courses. But the search is on at many institutions to find ways to broaden the use of technology in teaching—both to meet perceived student demand and to improve instruction and student services. Virginia Tech, for example, gives professors new computers for their offices if they agree to sit through three-or four-day workshops on using technology in the classroom. Other colleges now require incoming students to buy computers, and the requirements have inspired more professors—although not all—to put the machines to use. UCLAs approach is to offer to make Web pages for professors who aren't interested in doing it themselves.

The university created a $4.1-million annual infrastructure to support the Instructional Enhancement Initiative, or IEI, hiring about 80 technology consultants and adding about 700 new computers along with other new equipment. The consultants use templates to create a basic page for every course, work with departmental offices to get information, and then encourage professors to add material and participate in on-line discussions with their students. Some professors say the program infringes on their academic freedom by putting an unwanted teaching tool in their courses. But administrators say they're not forcing anyone to participate. 'Faculty are not being mandated, faculty are being provided with something,' says **David Wilson**, assistant dean of humanities for the College of Letters and Science. 'It's their course. If they don't want to use it, they don't have to.' The university has spelled out the same message in letters to department heads. The administration's message to students, however, is that every course will have a Web page, and that the pages will include, at a minimum, a course summary and a reading list. Those and other features were outlined in two-page advertisements describing the program in campus publications early this academic year.

Some professors have refused to participate because they want to keep tight control over their course information. Some suspect that the university might try to claim ownership of any course materials on the network. Others fear that Web surfers might steal their ideas. When asked by a UCLA staff member to send in a syllabus, one professor wrote instead: 'The big issue is intellectual property rights and their protection from being ripped off. . . . If I choose to make [the syllabus] available to someone, student or colleague, I do so on an individual basis.' Other professors with similar concerns have created two versions of their syllabi: a stripped version for the Web site, and a complete version to hand to students. A professor can also choose to limit access to sites, so that only students in the course can use it. Such reluctance has led some teaching assistants to joke that professors are afraid to show their shoddy work in public. But other professors have welcomed the program. They say it has given them the support they need to try new things. The Web-page program has led to some unexpected innovations. The most prominent example is 'My.ucla,' a service that automatically makes a

private Web page for every student at the university—more than 30 000 of them. The pages guide students to the Web sites for the courses they are enrolled in, as well as to sites for other campus resources.

Student reaction to the initiative has ranged from praise to picketing. A student committee that reviewed the plan last year recommended against it because of the student fee it included. A small group of students held a protest in November, and their main concern, too, was the fee. But the *Daily Bruin*, the student newspaper, gave the program a 'thumbs up' in a staff editorial in September. 'The Web pages are a valuable resource for students and are well worth the cost,' the editors wrote. The fee adds up to about $10 per humanities course and $14 per science course more than $100 a year for most students. Students seem very aware of the fees and are quick to complain when a particular course page doesn't seem worth its price tag. A survey of 4000 students conducted by the university in the fall found that over 60 per cent felt that the Web pages had increased their interaction with professors. Helping students choose their classes is one of the biggest benefits of providing Web pages for every course, says **Brian Copenhaver**, provost of the College of Letters and Science. 'Students will be able to learn huge amounts about what they can expect in a course before they even take it,' he says. 'And I think that's a really profound transformation in the way that we communicate about the curriculum.' That said, he acknowledges that fears about the program are understandable, because the Web is still so new in higher education. 'There haven't really been many times when the university has been through a technological change of this magnitude,' he says.

Virtual laboratories in chemical engineering
Virtual laboratories are becoming players in engineering education as the costs of instruction are soaring and laboratory space is at a premium. In a virtual laboratory students perform simulated experiments over the WorldWideWeb, with no limit on the number of students who can be served (see also the paper by Cabell *et al.* in Vol. 13 number 6 of this journal).

Michael Karweit, Research Professor in Chemical Engineering at Johns Hopkins University has set up such a laboratory for an introductory-level class in engineering. Dr. Karweit, who worked largely on his own and with no money from outside the university, took advantage of the new programming language Java to create eight computer programs that simulate laboratory experiments. The programs are known as 'applets'. With a recent version of any major Web browser, such as Microsoft's Internet Explorer or Netscape's Navigator, a student can run the simulated experiments at any hour of the day or night. The experiments are fully interactive, giving the student the opportunity to try different problem-solving strategies and even to fail outright. Some of the applets reproduce standard lab experiments, such as one requiring the student to design a bridge that can hold a specified weight. But others provide lab experiences that a university could never offer most undergraduates in the flesh, such as an applet that allows the student to program a robotic arm. A university couldn't afford enough robotic arms to equip an undergraduate engineering lab, Dr. Karweit says. The applets, which are available at http://www.jhu.edu/~virtlab, are used in a course that aims at giving freshman engineering students a taste of real-life engineering. His introductory engineering class and the virtual-laboratory applets are intended to give students a taste of the ways in which engineers try to find workable, cost-effective solutions to problems. Originally, the course included only hands-on laboratory experiments. In one such project, for example, students were instructed to estimate both the distance between two spires of a building and the accuracy of their estimates. In another, they were sent outside to estimate the number of blades of grass in part of campus. An applet allows a user to design a simple bridge and it estimates the stresses on various parts of the bridge as the student works. The experiment culminates with the student's building a model of the bridge out of dry spaghetti. Dr. Karweit tests each model to see if it can hold at least 6.6 pounds. 'It's still important, I think, for students to get the sense of working with their hands,' he says.

Battle over will left by wife of chemical engineering professor
Mildred Topp Othmer, who died of heart disease, had pledged nearly $450-million to various charities and institutions, including two universities, Polytechnic University in New York and the University of Nebraska, in her 1988 will. But Ms. Othmer's niece, Mary Seina, is contesting the will in county court in Omaha. She says Ms. Othmer revoked that will in 1995 because she wanted to leave less money to charity and more to her family. According to Ms. Othmer's will, Ms. Seina, who was her aunt's legal guardian, is to receive $2-million. The legal challenge rests on whether Ms. Othmer was competent to make financial decisions in 1995, when her niece says Ms. Othmer revoked her will. The revocation document has not been filed in court, and Ms. Seina's lawyer, James Fitzgerald, would not make it public.

Lawyers for the university and other charities contend that Ms. Othmer was incompetent to make decisions that would have changed her will as early as 1993 because she had Alzheimer's disease. Ms. Othmer's will gave the University of Nebraska about $100-million—the largest bequest in the university's history—to endow a general fund and a chemical-engineering professorship. The will also directs about $100-million to Polytechnic, $80-million to Long Island College

Hospital, $48-million to Planned Parenthood of New York City, and $10-million to the Omaha school district. A native of Omaha and an alumna of the University of Nebraska, Ms. Othmer earned a master's degree at Columbia University. She was married to Donald F. Othmer, a chemical engineer who held more than 150 patents on chemical processes. He was an engineering professor at Polytechnic from 1932 until his retirement in 1976. In 1961, the couple invested in a partnership with Omaha financier Warren Buffett, who is now the chairman of Berkshire Hathaway Inc., and is the second-wealthiest man in the United States, behind Microsoft's founder, William H. Gates III.

Africa

Engineering deans demand reformed curricula at universities
Universities in sub-Saharan Africa must markedly improve the standard of engineering and technical education if the region is to move beyond the stage of assembling products and achieve industrial growth, delegates attending a think tank in Nairobi heard. Under the auspices of UNESCO, deans of engineering from nine universities in eastern and central Africa met to discuss the introduction of revised engineering degree programs. The majority of existing engineering degrees imitate courses developed outside Africa and fail to focus on local needs. According to UNESCO, a lack of adequate external assessment and accreditation has led to 'academic in-breeding' and falling standards in both the engineering and medical professions in the continent. The conference resolved that a three-model program should be introduced into more than 100 colleges, all members of the Association of African Universities. Conference chairman, **Kosonike Koso-Thomas**, said: 'We conceptualised engineering models that must eventually place African countries among the group of nations with the highest technological competence. Many programs are still unattractive copies that have failed to address common problems in the continent.'

The Nairobi workshop, attended by deans from Kenya, Uganda, Tanzania, Ethiopia, Zambia and Zimbabwe, devised two new degree models: a regional model designed for mature students with a technical diploma education; and an international model for the most gifted students intending to pursue postgraduate studies outside Africa. The existing four-year degree program would be retained for candidates with 12 years of primary and secondary education. During the first year of this revised course, students would study basic sciences, general engineering, mathematics and communications skills. They would then pursue core engineering courses leading to a BSc. The new five-year regional BTech program would incorporate a mixture of bridging courses, supervised practicals, basic and professional engineering courses and industrial attachment. The third and

most demanding program, which would lead to an engineering masters, would give students the technical skills to compete at an international level and is intended to ensure that African universities are at the cutting edge of technological development. Graduates would be given scholarships to study abroad.

Conferences

SEFI Annual Conference
European Society for Engineering Education
2–4 September 1998
Helsinki, Finland
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Global Congress on Engineering Education
6–11 September 1998
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EQAS '98
Second International Conference on Quality Assurance within Engineering Education
13–16 September 1998
Zakopane, Poland
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Engineering Education '98
International Symposium IGIP
14–18 September 1998
Moscow, Russia
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Pedagogics in Design Education
19–20 November 1998
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CAL '99
Virtuality in Education
28–31 March 1999
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